Seasonal Influenza in Alberta

2010/2011 Summary Report

Government of Alberta

©Government of Alberta
October 2011
ISSN 1927-4114

Alberta Health and Wellness, Surveillance and Assessment Branch
Send inquiries to: Health.Surveillance@gov.ab.ca

Executive Summary

Seasonal influenza is a widely circulating viral infection that affects the respiratory system and can have a significant effect on the individual, health-care system and school and work absenteeism[1].

After the pandemic H1N1 influenza outbreak in 2009/10, this post-pandemic year was a more typical year for influenza activity in Alberta. Circulating laboratory-confirmed isolates were approximately half influenza A and half influenza B and the influenza incidence trend was similar to previous seasons, peaking in the months of February and March. Influenza A was the more prevalent strain for the first half of the season, followed by an increased incidence of influenza B. Whereas influenza A was more prevalent in the Calgary, Central, Edmonton and North Health Zones, influenza B was the dominant strain the South Zone.

Overall, the rate of lab-confirmed influenza cases was 41 cases per 100,000 people. Infants under two years of age had the highest rates of influenza; and influenza B was the dominant strain among school-aged children. The number of influenza outbreaks in 2010/11 was below the seasonal average, with the majority occurring in schools and long-term care facilities. Sentinel physicians reported lower percentages of patients visiting clinics for influenza-like-illness (ILI) compared to previous non-pandemic influenza seasons, and the number of visits to medical offices for influenza were similar to the previous non-pandemic season, 2008/09. However, there were significantly more visits to the emergency department for influenza compared to the 2008/09 season.

During the 2010/11 season, Alberta Health Services (AHS) reported 412 people hospitalized with lab confirmed influenza, of which 59 per cent were influenza A. Infants less than two years of age had the highest rate of hospitalization (86 cases per 100,000), followed by children aged two to four years (28 cases per 100,000) and people over 65 years of age (22 cases per 100,000). Eight cases died from influenza-related causes.

The 2010/11 influenza vaccine protected against three strains: H3N2 (A/Perth/16/2009) and H1N1 (A/California/7/2009) influenza A strains, and influenza B (B/Brisbane/60/08). There were a small number of influenza B isolates characterized as another lineage not covered by the vaccine (B/Wisconsin/01/2010). In 2010/11, over 600,000 doses of influenza vaccine were administered by Alberta Health Services, pharmacists and physicians through the universal Alberta immunization program. There were 241 reported adverse reactions following influenza immunization, 89 per cent of which were reported to have fully recovered. Three per cent recovered but at the time of adverse event reporting had minor side effects such as pain and/or swelling. The outcomes of the remainder of the adverse events were unknown or pending. No adverse events were fatal.

Antivirals were administered to 39 per cent of hospitalized cases. Antiviral resistance was monitored by the Provincial Laboratory of Alberta (ProvLab) and the National Microbiology Lab, and nearly all influenza strains identified were sensitive to oseltamivir and zanamivir. Almost all strains were resistant to amantadine.

---

[1] Alberta Health and Wellness. (2011). Influenza – Commonly called "the flu". Accessed online August 23, 2011, from http://www.health.alberta.ca/health-info/influenza.html.

Background

Overview of Influenza Virus

Influenza is a viral infection which affects the respiratory system; mainly the nose, throat, bronchi, and sometimes the lungs. The influenza virus can cause the following symptoms: fever, aching muscles, headache, severe malaise, non-productive cough, sore throat, and rhinitis, and sometimes diarrhea and nausea. It spreads easily from person-to-person, infecting mainly the young, old, and those with underlying medical conditions. Most cases recover within one to two weeks, while some develop severe complications such as pneumonia and possibly death[2].

In North America the types of influenza virus typically circulating are influenza A and influenza B, while the circulating strains of the virus vary each influenza season with three strains usually dominating. The dominant strains for North America are predicted in the spring of each year for the next season based on strains seen the previous season and circulating at the time in the Southern hemisphere. These strains are then incorporated into the annual influenza vaccine.

Each year around the globe the influenza virus causes a significant burden on health care systems and society in general. Although the disease manifestations are not severe for most cases, it still causes morbidity to those affected and lost productivity from work and school absence.

Influenza Activity in Alberta

In Alberta, influenza activity usually begins in the early fall (Week 40) and continues to mid spring (Week 20). In 2010/11, influenza activity tapered off around Week 21 in late spring. For the remainder of this report, the 2010/11 influenza season will be considered to have run from Week 40, 2010, to Week 21, 2011. (See Appendix A for a week by date reference for the 2010/11 season).

Influenza activity surveillance in Alberta consists of the collection, analysis, and reporting of results from several sources of information. Sources of data include: confirmed laboratory isolate information; sentinel influenza-like-illness (ILI) activity; school and closed facility outbreak notifications; physician claims data; and hospitalized case report forms.

During the 2009/10 influenza season a new novel influenza strain was circulating - pandemic (H1N1) 2009, (pH1N1) - which altered the traditional disease burden to include different sub-populations. Often throughout this report the 2009/10 influenza data has been excluded from seasonal averages due to the pandemic.

---

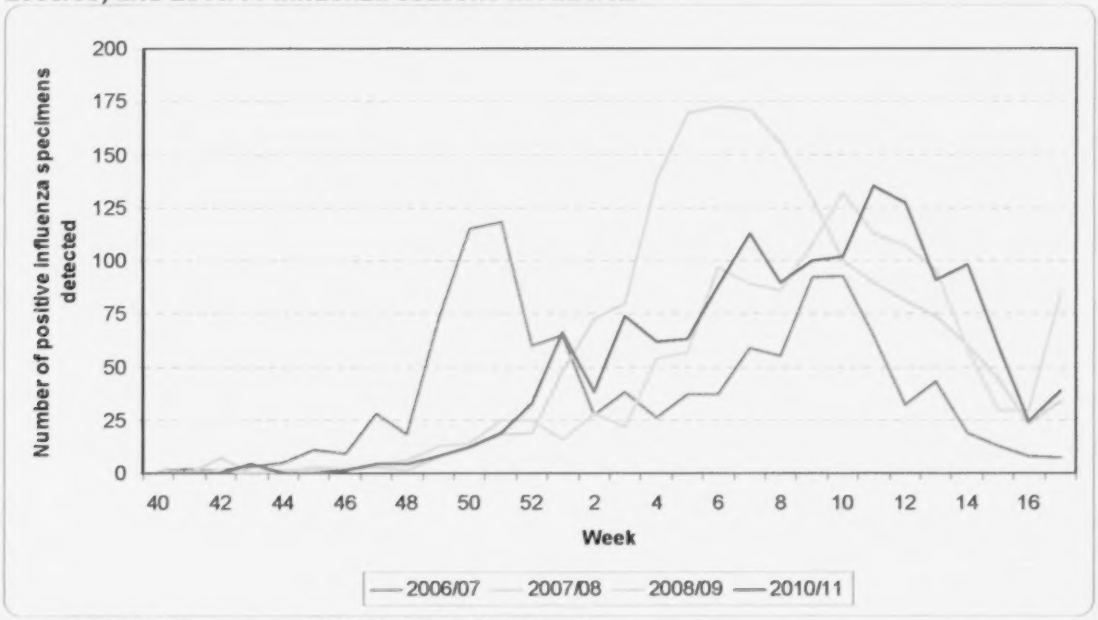
[2] World Health Organization. (2011). Influenza. Accessed online August 19, 2011, from http://www.who.int/topics/influenza/en/.

Influenza Activity in Alberta

The 2010/11 influenza season generally followed typical influenza activity patterns. Although the influenza season runs from Week 40 to the end of April 30, surveillance of influenza activity occurs year-round. For 2010/11, influenza activity continued into May before steadily declining.

When compared to the influenza activity of past years, the 2010/11 season was similar to 2007/08 and 2008/09, with peak activity in February and March. The 2006/07 season saw two peaks for activity – December and February/March (Figure 1). Finally, for the pandemic year of 2009/10, activity peaked in October/November, then virtually ceased after Christmas 2009.

Figure 1: **Laboratory confirmed influenza cases, by influenza week for 2006/07, 2007/08, 2008/09, and 2010/11 influenza seasons in Alberta.**

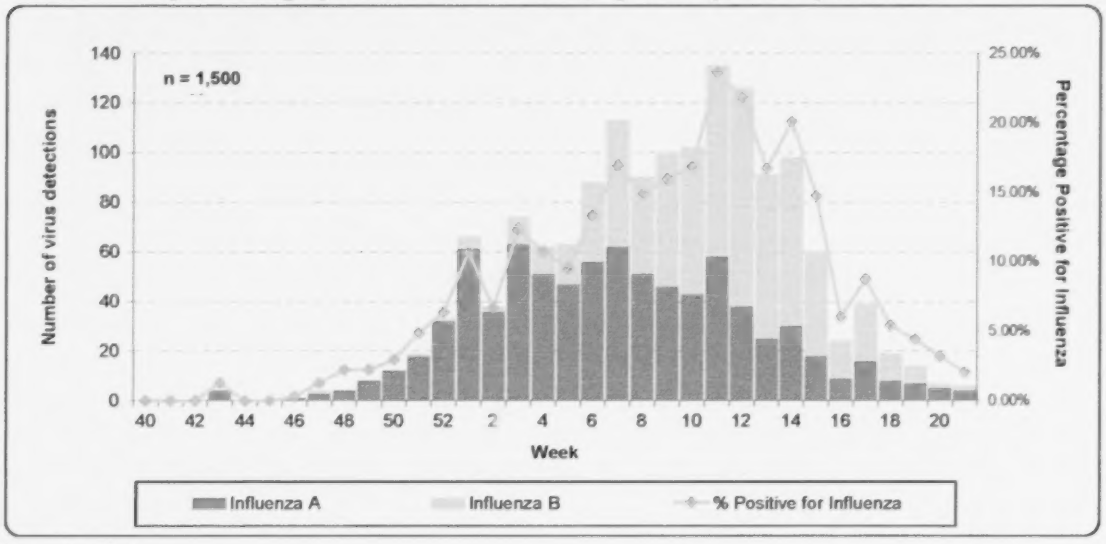


Source: Provincial Laboratory for Public Health (Microbiology) (ProvLab)
Note: 2009/10 season data excluded due to the pandemic.

Laboratory

Between October 3, 2010 and May 28, 2011, ProvLab confirmed 1,500 influenza isolates (Figure 2). Just over half of the isolates (54 per cent or 816 isolates) were influenza A and 684 isolates (46 per cent) were influenza B. For the influenza isolates, 244 were pH1N1, with the majority of the remaining isolates being the seasonal H3 strain. A small number of influenza A isolates were untypeable, usually due to low viral load. Week 11 (March 13 – 19, 2011) saw the largest number of detected influenza isolates in a single week (n=135), with 23.6 per cent of submitted specimens for respiratory virus testing positive for influenza (Figure 2).

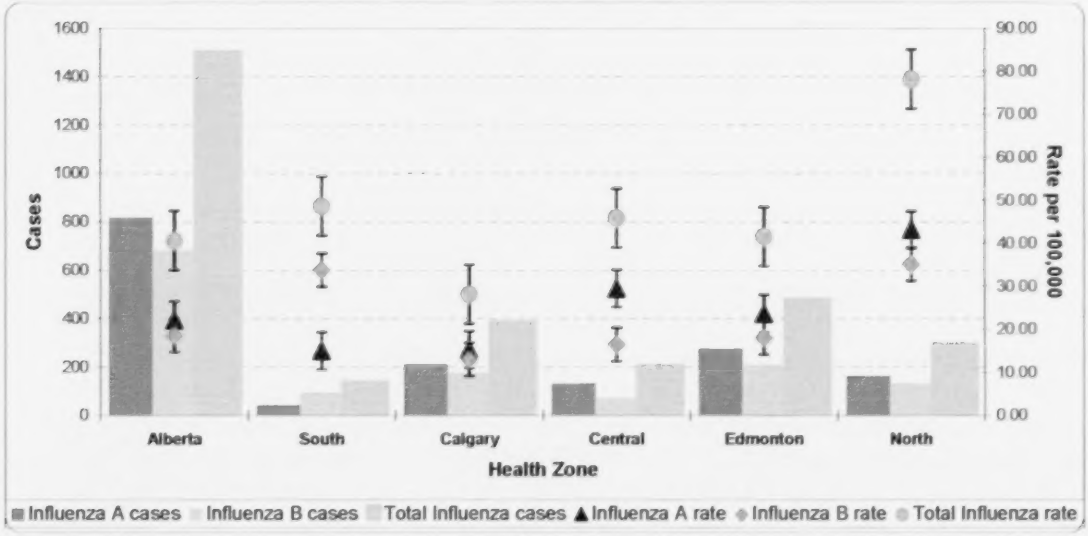
Figure 2: **Number of influenza detections among respiratory specimens submitted to the ProvLab and percentage positive for influenza, by week (2010/11) in Alberta**



Source: ProvLab

For the 2010/11 influenza season, the highest rates of influenza occurred in the rural zones: North (78 cases per 100,000 people); Central (45 cases per 100,000 people); and South (48 cases per 100,000 people). However, the largest numbers of cases were in the urban zones: Edmonton (480 cases) and Calgary (385 cases) (see Figure 3). Influenza A strains were more prevalent across the province except for the South Zone, where influenza B was more prevalent.

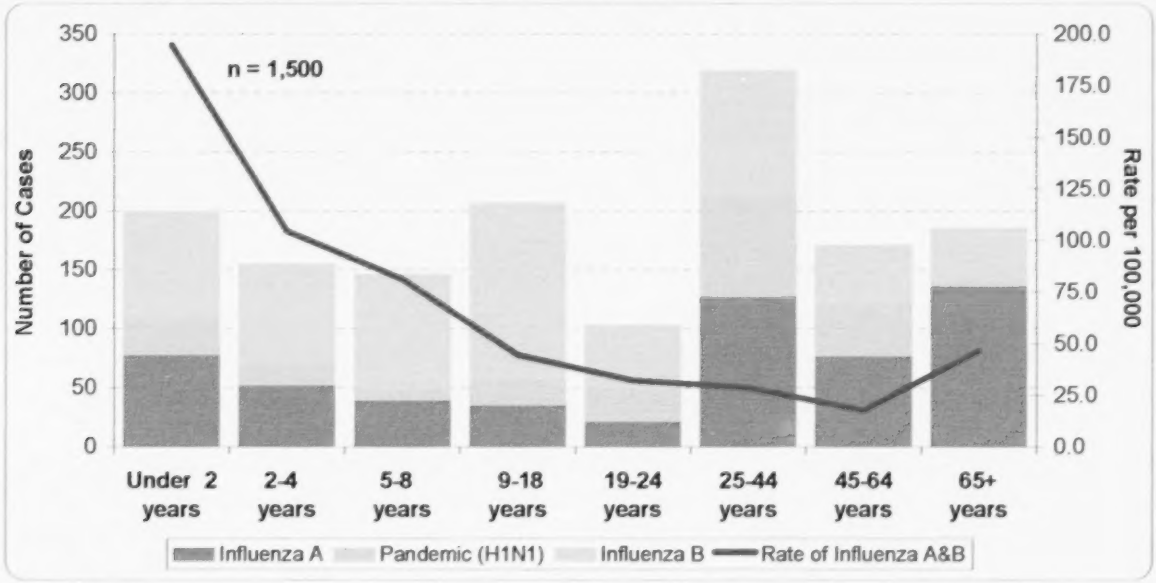
Figure 3: **Laboratory confirmed influenza cases and rate, by zone and type (2010/11) in Alberta**



Source: ProvLab

The rate of all lab confirmed influenza cases in Alberta was 41 cases per 100,000 people. For the 2010/11 season, the highest rates of influenza occurred in the under two years age group (195 cases per 100,000 people) and the lowest rate occurred in persons aged 45-64 years (17 cases per 100,000 people) (Figure 4). Influenza B was the dominant strain among school-aged children.

Figure 4: **Laboratory confirmed influenza cases and rates, by age group and influenza strain (2010/11) in Alberta for Week 40, 2010, to Week 21, 2011.**



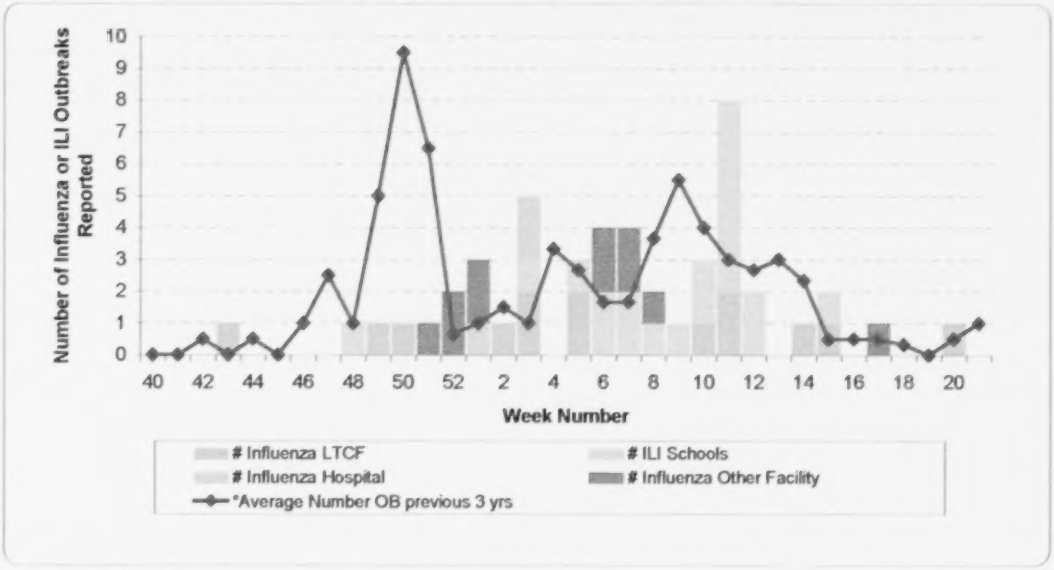
Source: ProvLab

Outbreaks

Each week Alberta Health and Wellness (AHW) receives reports of respiratory outbreaks. To be considered a long-term care facility (LTCF), hospital or other facility influenza outbreak, two or more cases of ILI within a seven-day period including at least one laboratory confirmed case, must occur. Other respiratory virus outbreaks, such as respiratory syncytial virus (RSV), parainfluenza, human metapneumovirus, or rhino/enterovirus are also reported to AHW. Finally, school outbreaks are reported when greater than 10 per cent of a school population are absent on any given day most likely due to ILI. Outbreaks are reported by date the investigation of the outbreak was started.

From October 3, 2010 to May 28, 2011, there were a total of 48 influenza/ILI outbreaks reported to AHW (Figure 10; Table 1), which was below the average number of outbreaks (70) from the past three non-pandemic influenza seasons (2006/07 to 2008/09). The majority of outbreaks in 2010/11 took place in schools (n=20) and LTCFs (n=14). Of the 48 outbreaks, the breakdown by Health Zone was as follows: **South** – 0; **Calgary** – 12; **Central** – 11; **Edmonton** – 17; and **North** – 8.

Figure 10: **Number of influenza and ILI outbreaks reported (2010/11), compared to the average number of outbreaks for the past three seasons, per week in Alberta.**



Sources: AIIW outbreak database
** 2009/10 (pandemic H1N1 2009) season excluded from outbreak average. Average includes data from 2006/07, 2007/08, and 2008/09.*

Table 1: **Number of ILI and influenza outbreaks reported, by facility type and influenza season in Alberta.**

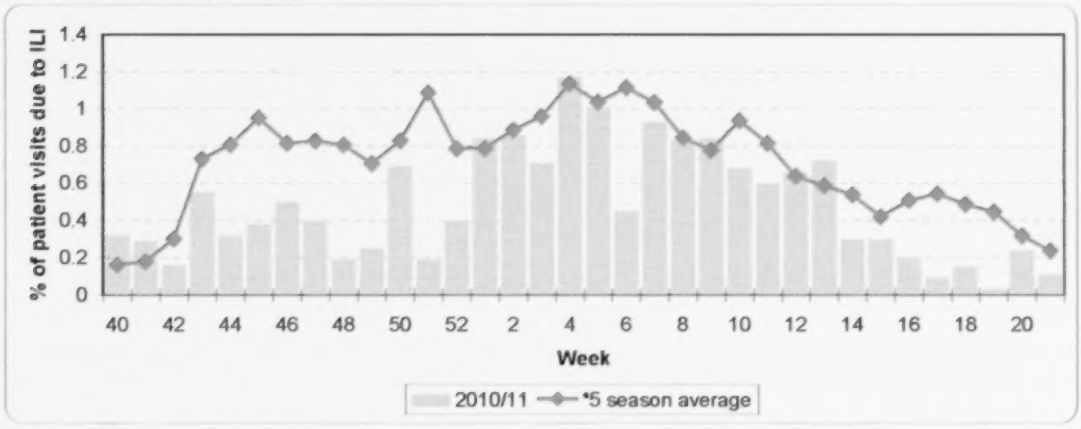
Season	LTCF	Hospital	School	Lodge/Other	Total
2003/04	25	2	29	5	**61**
2004/05	58	7	13	10	**88**
2005/06	28	5	46	17	**96**
2006/07	15	1	52	9	**77**
2007/08	32	2	16	14	**64**
2008/09	16	0	11	6	**33**
2009/10	6	3	983	5	**997**
2010/11	**14**	**3**	**20**	**11**	**48**

Source: AIIW outbreak database
Note: 2003/04-2009/10 data pulled August 11, 2010; 2010/11 data pulled August 10, 2011.

Sentinel Surveillance System

The sentinel physician system in Alberta, called The Alberta Recording and Research Network (TARRANT), is a network of physicians who monitor and report year-round on the number of patients coming through their medical offices with ILI, and take extra swabs to submit for testing. They often detect initial ILI activity each season. Sentinel physicians had slightly lower percentages of ILI patient visits over the 2010/11 season compared to previous non-pandemic influenza seasons (Figure 8).

Figure 8: **Percentage of sentinel physician patient visits due to ILI per week compared to the average percentage of ILI visits for previous seasons (2003/04, 2004/05, 2005/06, 2006/07, 2008/09) in Alberta.**

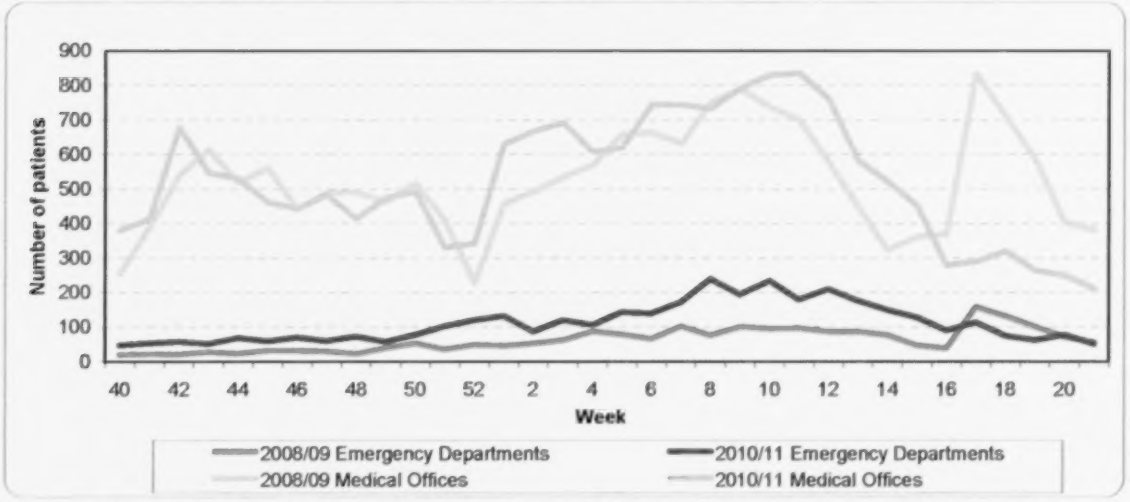


Source: TARRANT
**2007/08 season excluded due to incomplete data for season; 2009/10 data excluded due to the pandemic.*

Emergency Department and Physician Office Clinical Influenza

Physician claims data and ambulatory care data for emergency departments were used to identify clinically diagnosed influenza cases. In the 2010/11 influenza season, the number of influenza cases clinically diagnosed in emergency departments (3,182) was higher than the 2008/09 season (1,532) (Figure 9). The number of influenza cases clinically diagnosed in medical offices in 2010/11 (15,750) was also slightly higher than in 2008/09 (14,252).

Figure 9. **Number of influenza cases diagnosed in emergency departments and by general practitioners per week during the 2008/09 and 2010/11 influenza seasons.**

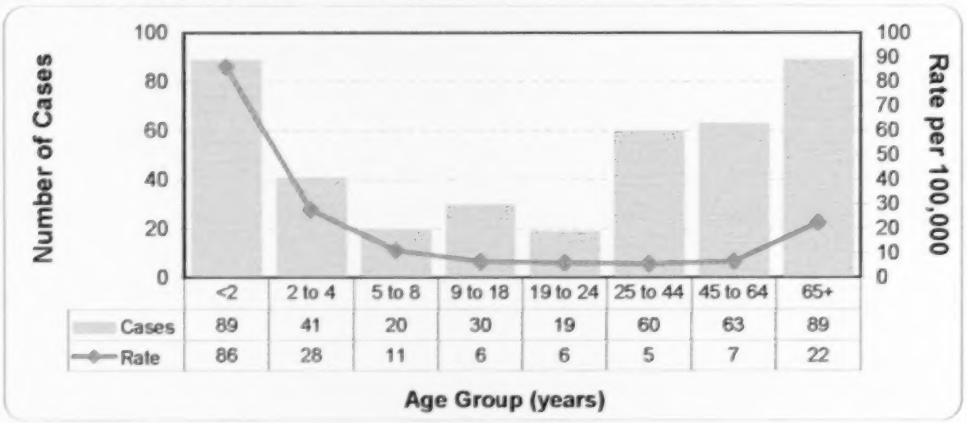


Source: Morbidity and Ambulatory Care Reporting (MACAR) system, Supplemental Enhanced Service Event (SESE) database
Note: 2009/10 data excluded due to the pandemic. Note sudden increase around Week 16 in the 2008/09 season for both Emergency Department visits and Medical Office visits for 2008/09, which coincides with the emergence of pH1N1.

Hospitalized Cases

Between October 3, 2010 and May 28, 2011, AHS reported 412 people hospitalized with lab confirmed influenza to AHW, of which 59 per cent were influenza A. They ranged in age from under one year of age to 99 years of age (See Figure 10). The median age was 26 years. The highest rate of hospitalization was in those under 2 years of age (86 cases per 100,000).

Figure 10. **Age distribution of hospitalized influenza cases.**



Source: Alberta Provincial Hospitalized Influenza and SRI Report form.
Note: n=411 hospitalized cases. 1 case had missing age at onset.

Of the total 412 hospitalized cases,

- 18 per cent (76) were admitted to the intensive care unit;
- 2 per cent (8) died from influenza-related causes;
- 16 per cent (66) were First Nations;
- 39 per cent (159) received antivirals;
- 17 per cent (68) had asthma;
- 14 per cent (57) had COPD;
- 17 per cent (71) had chronic heart disease;
- 15 per cent (62) had diabetes.

The influenza hospitalization rate was 13 cases per 100,000 Albertans. Overall, 59.2 per cent of hospitalized influenza cases were infected with influenza A (Figure 11). Influenza B appeared to have a greater impact on young children, while influenza A was more prevalent in the older age groups.

- **South Zone:** Hospitalizations were approximately half influenza A and half influenza B. Influenza B appeared to be causing more severe infection in young children, as 27.3 per cent of hospitalizations were influenza B infections in children under five years. Influenza A subtype H3 appeared to be associated with more severe infection in adults aged 50 to 64 years (13.6 per cent of hospitalizations).

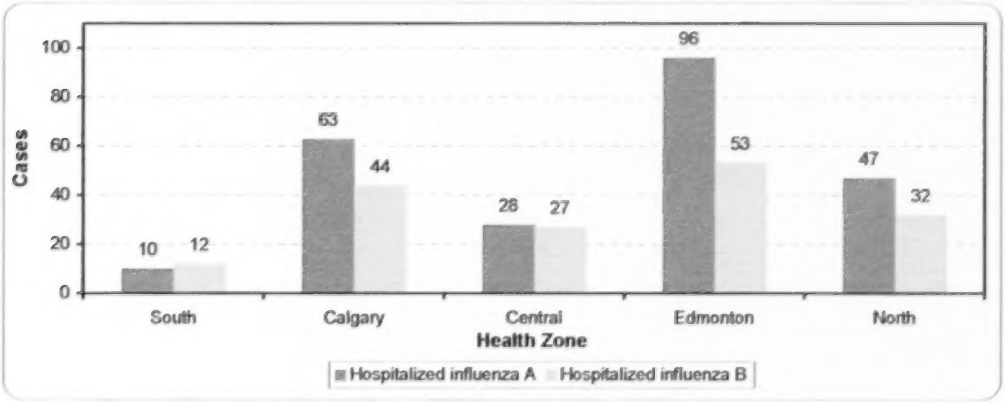
- **Calgary Zone:** Overall, there were more influenza A than influenza B hospitalizations in the Calgary Zone; however, influenza B appeared to have caused more severe infection in children under five years of age (17.0 per cent of hospitalizations), and school-aged children aged five to 18 years (13.2 per cent of hospitalizations).

- **Central Zone:** Much like the South Zone, hospitalizations were approximately half influenza A and half influenza B. Influenza B had a large impact on young children as 24.1 per cent of hospitalizations were children under five years with influenza B. Influenza subtype H3 was also fairly prevalent as 16.7 per cent of hospitalizations were patients 65 years and over with confirmed H3.

- **Edmonton Zone:** There were significantly more influenza A hospitalizations than influenza B hospitalizations in the Edmonton Zone. Influenza subtype H3 had a large impact on adults 65 years and older, as they accounted for 20.1 per cent of hospitalizations. However, influenza B did have some impact as 9.4 per cent of hospitalizations were children under five years with influenza B, and 11.4 per cent were adults 65 years and older with influenza B.

- **North Zone:** The North Zone had slightly more influenza A hospitalizations than influenza B. Once again, influenza B caused more severe infection in young children as 19.0 per cent of hospitalizations were children less than five years with influenza B. However, both influenza A subtypes H3 and H1N1 had a significant impact on young children as well (11.4 per cent of hospitalizations were children under five years with H3, and 12.7 per cent with H1N1). H1N1 was also fairly prevalent in adults as 17.7 per cent of hospitalizations were adults aged 19 to 49 with confirmed H1N1.

Figure 11. **Number of hospitalized cases by influenza type and Health Zone.**



Source: Alberta Provincial Hospitalized Influenza and SRI Report form.

Prevention

Immunization

The 2010/11 seasonal influenza vaccine offered protection against H3N2 (A/Perth/16/2009) and H1N1 (A/California/7/2009) influenza A strains, and influenza B (B/Brisbane/60/08). Almost all circulating influenza A and B isolates were compatible with the 2010/11 vaccine in Alberta, although there was a small number of influenza B isolates being characterized as another lineage (B/Wisconsin/01/2010)[3].

In Alberta, seasonal influenza immunization became a universal program in fall 2009 for the first time. In 2010/11, the campaign ran from October to April. Immunization numbers are based on the number of influenza immunization forms filled out by AHS and submitted to AHW, as well as pharmacist claims and physician claims.

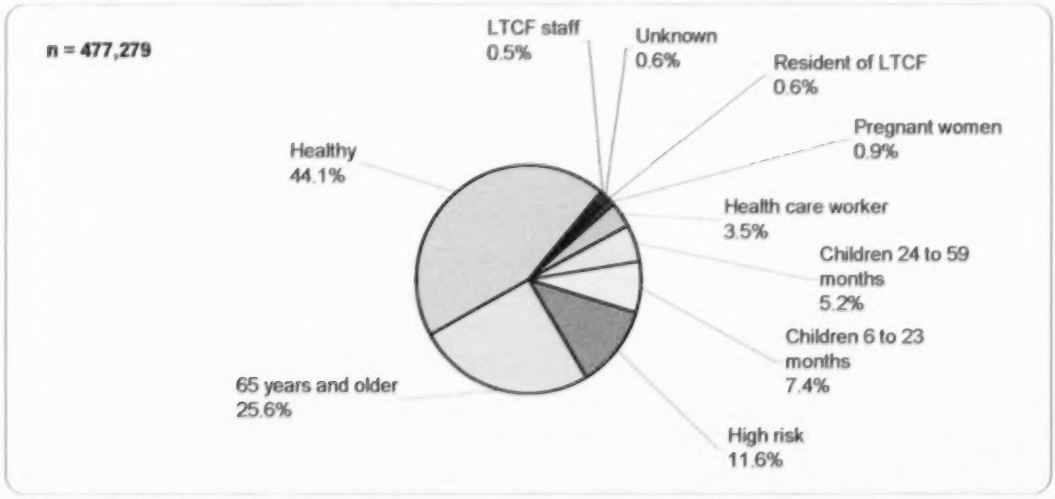
Table 3. **Number of 2010/11 seasonal influenza doses administered, by provider.**

Provider	Doses Administered	% of total
AHS	477,297	79
Pharmacists	47,777	8
Physicians	76,490	13
Total	**601,564**	

Source: AHS doses from AHW electronic influenza immunization records; Pharmacist and physician doses from Alberta Blue Cross claims.
Note: Number of doses administered does not equate to the number of people immunized, as children receiving their first influenza immunization receive two doses of vaccine.

For the first year, influenza immunization data provided by AHS was made electronic. The majority of influenza immunization recipients fell under the following reason codes for immunization: healthy (44.1 per cent), 65 years and older (25.6 per cent), or high risk (11.6 per cent) (Figure 12).

Figure 12. **Percentage of doses administered by AHS Public Health by reason code.**



Source: AHW electronic influenza immunization records.

[3] National Microbiology Laboratory

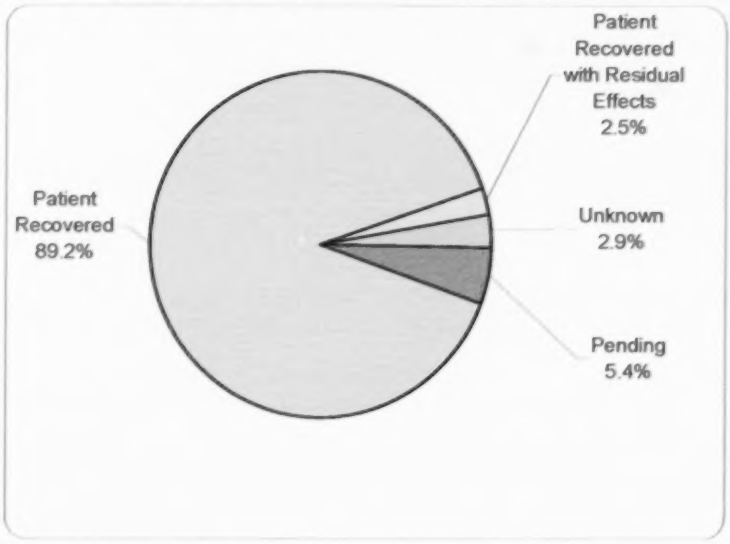
Adverse Events Following Immunization

A key part of immunization surveillance is monitoring the pharmacovigilance and safety of influenza immunizations administered, both seasonal and pandemic. Reporting and monitoring of adverse events following immunization (AEFIs) are critical to safety surveillance, confirming or refuting results of pre-licensure clinical trials, and providing a process to identify any unusual events. This monitoring is done through tracking AEFIs. An AEFI is defined as a serious or unexpected event temporally associated with immunization.

Common or expected side effects of an immunization are usually mild, predictable and self-limiting; therefore, these events are not reported. It is important to note that while reported events are temporally related to an immunization, they are not necessarily causally linked and this should be considered when interpreting the following information.

During the 2010/11 influenza season, there were 241 AEFIs reported to AHW. The majority of AEFIs fully recovered (89.2 per cent) at the time the AEFI was reported. About 2.5 per cent of cases recovered but at the time of AEFI reporting had some remaining minor side effects, such as pain and/or minor short-term swelling. No cases were fatal (Figure 13).

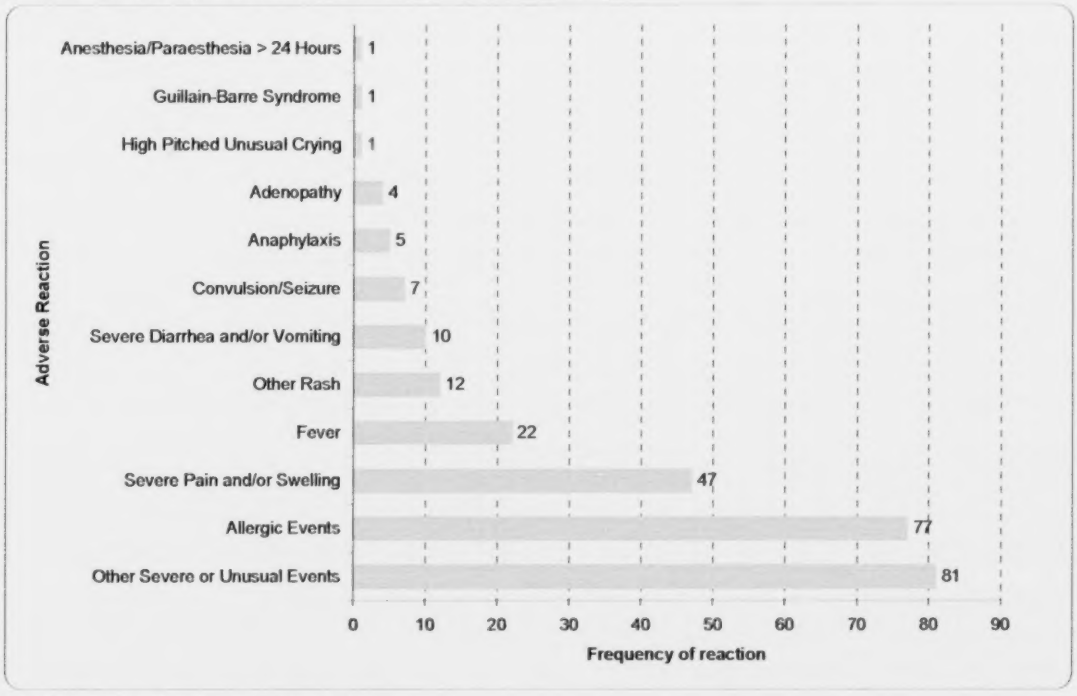
Figure 13: **Outcomes of patients following influenza immunization AEFIs in 2010/11.**



Source: Imm/ARI database

For the 2010/11 seasonal influenza vaccine, the most frequently reported types of AEFIs were allergic reactions (77 events), severe pain and/or swelling (47 events), and other severe or unusual events (81 events) (Figure 14). The overall rate of reported AEFIs, based on the number of doses administered by AHS, pharmacists and physicians, was 45 events per 100,000 doses.

Figure 14: **Frequency and type of adverse reaction following 2010/11 seasonal influenza immunizations (241 events with n=262 reactions).**



2010/11 AEFI Source: Imm/ARI database

AEFIs continue to be monitored and assessed in Alberta by medical officers of health and the AHW immunization team.

Antiviral Resistance

As of July 14, 2011, 99.5 per cent of influenza A isolates submitted to the National Microbiology Laboratory were susceptible to oseltamivir, and all were susceptible to zanamivir. Almost all isolates (99.9 per cent) were resistant to amantadine (Table 4). In Alberta, no influenza A isolates tested by ProvLab exhibited resistance to oseltamivir. Many of these isolates came from severe cases, cases involved in influenza outbreaks, and TARRANT patients.

Table 4. **Number of influenza isolates, by strain, exhibiting resistance or susceptibility to antivirals oseltamivir, zanamivir and amantadine (Canada).**

		Oseltamivir	Zanamivir	Amantadine
H1N1	Sensitive	153	151	0
	Resistant	1	0	170
H3N2	Sensitive	258	255	1
	Resistant	1	0	496
B	Sensitive	578	578	N/A
	Resistant	1	1	N/A

Source: National Microbiology Laboratory

APPENDIX A

2010/11 Influenza season reporting weeks

Week number	Week starting
40	3-Oct-10
41	10-Oct-10
42	17-Oct-10
43	24-Oct-10
44	31-Oct-10
45	7-Nov-10
46	14-Nov-10
47	21-Nov-10
48	28-Nov-10
49	5-Dec-10
50	12-Dec-10
51	19-Dec-10
52	26-Dec-10
1	2-Jan-11
2	9-Jan-11
3	16-Jan-11
4	23-Jan-11
5	30-Jan-11
6	6-Feb-11
7	13-Feb-11
8	20-Feb-11
9	27-Feb-11
10	6-Mar-11
11	13-Mar-11
12	20-Mar-11
13	27-Mar-11
14	3-Apr-11
15	10-Apr-11
16	17-Apr-11
17	24-Apr-11
18	1-May-11
19	8-May-11
20	15-May-11
21	22-May-11